redirect light from the objective to the ocular a light redirection means in the form of a Schmidt prism **23** is provided.

As discussed above the optical device **2** is mounted onto a frame **12** and is preferably used in pairs to provide binocular vision. To position and support the optical devices in proximity to the eyes of the viewer, stems **24** are connected to the frame **12** by mountings **25**. The stems attach to the mountings by pivot screws **26** and are slidably adjustable within the mounting **25**. In use the stems **24** extend from the frame **12** along each side of the head of the viewer towards and over the ears in a similar way to the stems or side arms of spectacles which support and position the spectacles on a user. The frame **12** also has a nose support or bridge **44** for supporting the frame on the nose of a viewer again in a similar manner to spectacles.

While this embodiment relies on a spectacle frame type arrangement which in use positions and supports the optical devices in proximity to the eyes of the viewer, it would be appreciated by those skilled in the art that other similar attachment means could be used provided they allow the viewer to change the field of view through the objective by movement of the position of the viewers head rather than having to undertake a lengthy adjustment procedure.

Once the interpupillary distance between the optical devices is set and the stem **24** and mounting **25** adjusted to correctly position the optical devices on the viewer it is essential that the optical devices are adjusted to ensure that the optical axes of each optical device converge at a central point which is at the working distance of the apparatus. This working distance will generally be within arms length of the viewer and below the normal level of sight of the viewer. Once the actual alignment is correctly set the optical devices are locked into position on frame **12** by the locking screw **14** on collar **13**.

To ensure that sufficient light is provided at the working distance the frame is provided with a lamp assembly **30**. The lamp assembly is mounted on the frame between the optical devices and is co-planar (in a longitudinal plane) with the optical devices.

The location of the lamp assembly **30** on the frame midway between the optical devices provides what is termed in the art true co-axial illumination. In other words the light beam and the vision of the user are co-focused and over the area of vision this is termed co-axial illumination. This is very important in intraocular surgery as it produces the red reflex which enables the surgeon to view things which are transparent when performing delicate eye operations. Another way of describing the term co-axial illumination is that the light beam and the point where the user's vision is focused are always co-incident so that when the user changes the field of vision the light beam covers the new object. In the general sense the light beam is co-axial with the converging field of vision.

The lamp assembly **30**, shown in FIG. **4** is mounted on frame **12** and comprises a lamp **31** fitted into a brass socket **32** which is mounted on the wall of the lamp assembly. The lamp **31** projects light through a bicylindrical lens **33** which is spaced from a condensing lens **34** by spacers **35**, **36** to produce a gradually diverging light beam out of the end **40** of the light assembly.

The lamp is powered by a twelve volt local power source (not shown) which is connected to the socket by leads **37**. The local power source is preferably a battery power pack which is carried by the viewer. The lamp assembly is connected to the frame **12** by an aluminum member **38** which also acts as a shield to the viewer from the heat generated by the lamp. To further insulate the viewer from the heat generated, cork compound heat shield **39** is also provided.

As would be appreciated by those skilled in the art the apparatus in accordance with the invention enables a surgeon, jeweller or the like artisan to observe or operate at a level below his/her normal line of sight while maintaining his/her head in an upright position and also allows the viewer to change the field of view by moving the position of his/her head. The invention therefore provides an improved apparatus which overcomes the deficiencies of the prior art.

What is claimed is:

1. Binocular, bent-axis optical loupes, comprising:
   - a frame including means for attaching the frame on the head of a human user;
   - a pair of optical devices mounted on the frame at positions proximate a respective eye of a human user, wherein each such device includes an ocular having an ocular axis, which ocular axis is in line with the normal visual axis of the human user when looking straight ahead when the frame is attached to the head of the human user, an objective which defines a field of view outside the normal visual axis of the human user when looking straight ahead, the objective having an objective axis, the objective axis intersecting the ocular axis at an obtuse angle which angle opens toward the human user when the frame is attached to the head of the human user, and a light transfer device located between the ocular and the objective where the objective and ocular axes intersect, which light transfer device redirects light from the objective to the ocular, whereby an object which appears in the field of view of the objective is capable of being viewed through the ocular; and
   - a light source provided on the frame between the optical devices, the light source providing a gradually diverging beam directed to illuminate the object being viewed in a manner which gives the effect of true co-axial illumination.

2. The optical loupes of claim **1**, wherein the obtuse angle is in the range of 120° to 150°.

3. The optical loupes of claim **2**, wherein the objective axes of the optical devices converge at an object being viewed.

4. The optical loupes of claim **3**, wherein the light beam and the objective axes are focused on the object being viewed.

5. The optical loupes of claim **4**, wherein the device for attaching the frame on the head of a human user comprises a pair of respective side arms and a nose support whereby the optical loupes are worn similar to a pair of spectacles with each ocular proximal to a respective eye of the human user.

6. The optical loupes of claim **1**, wherein the device for attaching the frame on the head of a human user comprises a pair of respective side arms and a nose support whereby the optical loupes are worn similar to a pair of spectacles with each ocular proximal to a respective eye of the human user.

7. The optical loupes of claim **5**, wherein the light transfer device is a Schmidt prism.

8. The optical loupes of claim **7**, wherein the objective axis and the ocular axis of each optical device intersect at an angle of about 135°.

9. The optical loupes of claim **1**, further comprising means for making limited lateral adjustments of the optical devices on the frame, whereby the optical loupes may be adjusted to an interpupillary distance of the human user.

10. The optical loupes of claim 9, wherein the means for making limited lateral adjustments of the optical devices includes locking screws for locking the optical devices in position on the frame.

11. The optical loupes of claim 1, wherein each ocular includes a pair of ocular lenses and a field lens, and each objective includes a pair of objective lenses located at a distal end of the objective.

12. The optical loupes of claim 11, wherein the light transfer device comprises a prism disposed at a position spaced from the ocular lenses and field lens and from the objective lenses.

13. The optical loupes of claim 12, wherein each optical device further comprises a first tube in which the ocular lenses and field lens are disposed, and a second tube in which the objective lenses are disposed.

14. The optical loupes of claim 13, wherein the objective lenses are disposed at a distal end of the second tube, and a window configured to facilitate optical axis alignment is provided in a side of the second tube.

15. The optical loupes of claim 14, wherein the light source is positioned on the frame midway between the optical devices.

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